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Docket Number 50-346

License Number NPF-3

Serial Number 1-908

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United States Nuclear Regulatory Commission
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Washington, D. C. 20555

Subject: Response to Inspection Report Number 50-346/89021

Gentlemen:

Toledo Edison (TE) has received Inspection Report Number 89021
(Log Number 1-2195) and provides the following response.

Violation

89021-01: 10CFR50, Appendix B, Criterion XI, as implemented by the Davis-Besse Quality Assurance Program requires, in part, that the testing of systems and components be controlled by procedures which incorporate the applicable requirements and acceptance limits. These procedures shall include provisions for assuring that all test prerequisites are met, that adequate test instrumentation is available, and that the test is performed under suitable environmental conditions.

Contrary to the above, pressure testing performed in lieu of the ASME Code required hydrostatic test on the main steam, feedwater, service water, and other systems during the Fall 1988 outage was not adequately controlled in that:

- a. Interim and post verification of channel sensitivity, considered a prerequisite for acoustic leak testing, was neither performed nor required by the test procedures (346/89021-01A).
- b. The lack of a qualified, well defined relationship between background noise level and leak detection sensitivity did not permit evaluation of the suitability of environmental conditions encountered during the test (346/89021-01B).
- c. The test procedures did not define the acceptance criteria and insufficient instrumentation was used (346/89021-01C).

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Acceptance or Denial of the Alleged Violation

Toledo Edison denies the alleged violation.

Reason for Denial of the Alleged Violation

Testing of systems and/or equipment during the Fall 1988 Outage was performed in accordance with approved Davis-Besse and HAFA test procedures. Test prerequisites were met, adequate and properly calibrated test instrumentation was installed at required locations, and the tests were performed under suitable environmental test conditions. TE's bases for this statement are provided below for each part of the Notice of Violation.

Response to
89021-01A:

The bases for NRC's conclusion that interim and post verification of channel sensitivity is considered a prerequisite for acoustic leak testing were not established nor was a reference made to any such requirement in Inspection Report Number 89021.

HAFA Operating Procedure 13.02, Section 6.12 requires calibration at setup to determine sensor and channel sensitivity. For testing based on acoustic emission data only the adjacent sensor is required to detect a 20 decibel (dB) minimum level signal to ensure system sensitivity and proper sensor spacing.

The Main Steam test was the only test that used acoustic emission testing exclusively. During this test, appropriate acoustic sensors, calibrated by the manufacturer and verified by HAFA in the field, were installed as required by Davis-Besse test procedure DB-PF-10019.

Prior to the IIT test, each sensor was subjected to a pencil-lead break test as part of its field calibration as required by HAFA Operating Procedure 13.02. Throughout the tests, channel checks were conducted to verify system operability. Sensor checks required by HAFA procedures were performed and are considered adequate.

Toledo Edison is not aware of any other requirements for interim and post-test checks of sensors other than those performed. There were several enhancements that were recommended by Dr. M. Hamstad, who performed an evaluation of Davis-Besse's Main Steam IIT test. Regarding these recommendations, Dr. Hamstad stated that they referred primarily to additional checks to provide additional assurance. However, their performance is not required by procedure or to validate the IIT test. The required sensor checks are documented in the test records for each individual test.

The pencil-lead break check performed prior to testing is considered an acceptable method of sensor calibration by industry standards. ASTM Standard E 976, Section 5.3.3 states that a repeatable acoustic wave can be generated by carefully breaking a pencil lead against a test block and describes the basis for this. Use of the pencil lead break test is also supported by the Acoustic Emission Handbook (Part 6, Acoustic Emission Examination Procedures). The subsection on artificial reference sources names three types of reference sources commonly available and suitable for both laboratory and in situ verification. One of these, the brittle fracture source or pencil lead (Hsu-Neilson) source, is described as a very intense source generated by the brittle fracture of a pencil lead of fixed diameter (0.5-mm) and hardness (2H). The pencil-lead break test is also recognized as an acceptable field calibration method in NUREG/CR-5134.

Dr. Hamstad's review of the IIT concluded that the standard lead break calibration technique used by HAFA, along with reasonable sensor spacing, provided assurance that leaks will be detected in the field. The review concluded that this approach checks the sound transmission of the adhesion from the pipe to the wave guide, the wave guide (with welded conical sections), and the adhesion between the wave guide and the sensor. In addition, it checks the sensor and the subsequent electronics for the associated channel of the acoustic measurement system and provides information to check the sensitivity of the sensor to leaks that may exist at some distance from the sensor.

The IIT does not require that a continuous signal be used as a calibration or verification source. Dr. Hamstad recommended this for an extremely conservative approach but it was not a requirement. ASTM E 1211, Section 8.3, calls for periodic sensitivity checks during long tests (days) or if any environmental changes occur. The IIT tests performed at Davis-Besse were of short duration (< 6 hours) except for the Main Steam test, which took several days to complete. During this test, environmental changes were anticipated and wave guides were used to prevent temperature changes from having an adverse impact on the sensors. The bases for this IIT AE testing configuration was documented in HAFA Interim Report 1005-88. Therefore, TE does not believe that the ASTM standard practice requirement applies to the IIT testing performed at Davis-Besse.

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Response to
89021-01 B:

For IIT Acoustic Emission tests, HAFA Operating Procedure 13.02, Section 6.12.5, requires that a simulated leak acoustic source be used to verify operating sensitivity of the Electro-Acoustic Ranging System (EARS) RMS data output. HAFA has verified operating sensitivity using a simulated leak source during calibration at their facility. HAFA Operating Procedure 13.02, Section 8, requires EARS to be activated for data acquisition and personnel to monitor real-time graphical displays for on-line analysis as appropriate. During actual IIT testing on the Main Steam System, the background noise was measured at zero pressure. The background noise was also measured and recorded throughout the test. For example, during the Main Steam test background noise levels were recorded with two Reactor Coolant Pumps running and later with three. Background noise was verified at zero pressure and at changes in pressure during the test. Additionally, the background noise was continuously monitored, recorded, and evaluated throughout the test. HAFA Operating Procedure 12.1, which controls IIT tests performed using Leak Measuring Devices (LMDs) for water-filled testing applications, allows acoustic emission equipment to be used as an aid to detect out-leakage and intersystem leakage. Section 6.7.3 of that procedure requires that background values at each location be developed prior to pressurizing or after depressurizing the test system and while at test pressures or at pressure plateaus, as directed by the test leader.

For both types of IIT tests, the ratio of background noise to other sources of noise established a threshold for an acoustical event making an actual acoustical event easily discernible to a qualified individual. Therefore, during the conduct of these tests, provisions were included to allow an evaluation of the suitability of environmental conditions.

Response to
89021-01 C:

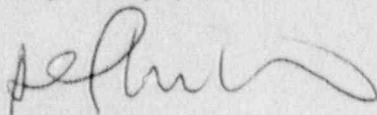
The acceptance criteria for IIT AE testing is defined in Davis-Besse procedure DB-PF-10019 and the HAFA Topical Report. The acceptance criteria for IIT testing is a VT-2 examination per ASME Section XI, IWA-5240. For the IIT AE type test (Main Steam only), the AE data must be reviewed to confirm it supports the visual examination results. An evaluation of acoustic data, as required by HAFA Topical Reports 135 (P-A), must be completed which confirms the acceptability of the IIT test. Criteria to analyze and approve AE data is provided in HAFA Reports 1008-88 and 1009-88. (Reference Section 7.0, Acceptance Criteria, of DB-PF-10019.)

Adequate and sufficient instrumentation was installed and utilized for IIT tests conducted at Davis-Besse in accordance with the NRC approved HAFA Topical Report and Davis-Besse test procedures. Although not specifically stated, the basis for the violation appears to be based on the NRC's current interpretation of the testing concept. Page 10 of the NRC Inspection Report states that the testing methodology for IIT testing of water filled systems utilize LMD instrumentation supplemented by acoustics to ostensibly detect and locate test boundary leakage. Additionally, it was the staff's understanding that the entire test boundary would be instrumented with acoustic sensors. The IR states that a sample review of test data indicated that the implementation deviated from the approved concept in that some test boundary valves were not instrumented at all and that acoustic sensors were not placed along the test boundary at prescribed intervals.

It appears that the NRC has intermixed the requirements for the two types of tests. The IIT test approved under the umbrella of the HAFA Topical was for testing of water filled system utilizing an LMD to determine system leakage supplemented by acoustics in specific applications. In some cases an outlet LMD was used. There were no specific requirements for locating acoustic sensors or spacing for this type of testing. For the acoustic type test, used on the Main Steam System at Davis-Besse, these requirements were imposed. The NRC Staff did not approve this method in the Topical, however, it was approved for use at Davis-Besse by letter (Log Number 2715) dated September 28, 1988.

Should there be any questions regarding this matter, please contact Mr. R. W. Schrauder at (419) 249-2366.

Very truly yours,



EBS/ssg

cc: P. M. Byron, DB-1 NRC Senior Resident Inspector
A. B. Davis, Regional Administrator, NRC Region III
T. V. Wambach, DB-1 NRC Senior Project Manager